

# QUICK START GUIDE

## HARRIER USB/HDMI

## CAMERA INTERFACE BOARD

### Introduction

This guide is designed to get you quickly up and running with the **Harrier USB/HDMI Camera Interface Board** (AS-CIB-USBHDMI-002-A) and the Harrier USB/HDMI Evaluation Kit (AS-CIB-USBHDMI-001-EVAL-A). The interface board can be purchased with a Sony FCB-EV-series LVDS camera as a pre-assembled unit; example shown in Figure 1 (AS-CIB-USBHDMI-002-7520-A).

This document should be read in conjunction with the datasheet and other documents available on [Active Silicon's website](https://www.activesilicon.com), (see Harrier USB/HDMI Camera Interface Board - Downloads section):

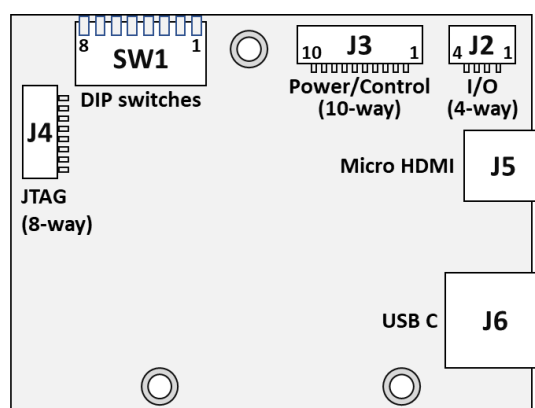
<https://www.activesilicon.com/products/harrier-usb-hdmi-camera-interface-board/>



**Figure 1. Harrier USB/HDMI interface board mounted on a Sony FCB-EV7520**



**Figure 2. Reverse side of Harrier USB/HDMI Camera Interface Board**



**Figure 3. Interface board block diagram showing position of connectors and DIP switches**

*The Harrier USB/HDMI Camera Interface Board can also be supplied in USB-only variants. A 3G-SDI/HD-SDI camera interface board is also available. For more details contact Active Silicon.*

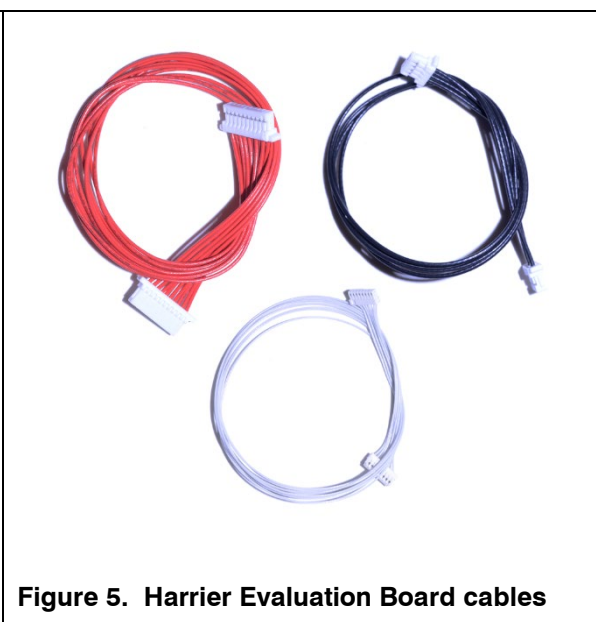
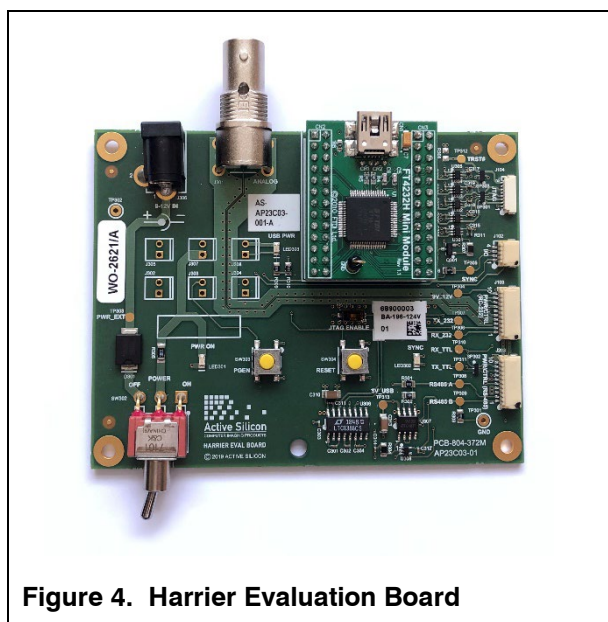
## **Evaluation Kit Contents**

The Evaluation Kit (AS-CIB-USBHDMI-001-EVAL-A) contains all the parts needed to evaluate the Harrier USB/HDMI Camera Interface Board.

Note that the Evaluation Kit does not include a Harrier USB/HDMI Camera Interface Board or camera, these need to be ordered separately.

Please check that you have all the parts listed below:

- Harrier Evaluation Board (Figure 4)
- 10-way cable (Figure 5)
- 4-way cable (Figure 5)
- White 8-way cable (Figure 5)
- Micro HDMI cable
- 30-way micro coax cable (KEL cable; Figure 1 and 6)
- USB-C plug to USB-A socket adapter
- USB Type A to mini USB Type B cable
- USB3 USB Type C SuperSpeed (5 Gbps minimum) cable
- Multi-region 12V power supply (please fit the adapter suitable for your region)



## Configuring the Board for the Camera

The Harrier USB/HDMI Camera Interface Board is not automatically configured for your camera; for optimum USB performance the board will need to be re-configured to support the correct camera. If you have purchased a pre-assembled camera unit then the board will already be correctly configured for the camera.

When the interface board is connected by a USB3 cable it will appear in the camera section of Windows Device Manager (or in most UVC video applications). Depending on how it is configured it will appear with a different name, for example:

**Active Silicon Harrier S9520-2** – for Sony EV-9520L camera

**Active Silicon Harrier S9500-2** – for Sony EV-9500L camera

**Active Silicon Harrier S7520-2** – for Sony EV-7520 camera

**Active Silicon Harrier T3010-2** – for Tamron MP3010M-EV camera

**Active Silicon Harrier 10LHD-2** – for Harrier 10x AF-Zoom Camera

**Active Silicon Harrier 36LGHD-2** – for Harrier 36x AF-Zoom Camera with global shutter.

**Active Silicon Harrier 40LHD-2** - for Harrier 40x AF-Zoom Camera.

To change the configuration of your Harrier USB/HDMI Camera Interface Board please go to the software section of [www.activesilicon.com](http://www.activesilicon.com) and download the [HarrierControl software](#). Instructions for changing the board configuration are included in the download.

## Quick Start

You can get the board up and running very quickly with the Evaluation Kit and these items:

- PC with Superspeed USB port with high current capability (typically Type C socket rated at 1.5 Amp or more) or externally powered USB3 hub (e.g. Startec ST4300MINI).
- Sony FCB-EV-series LVDS camera and 30-way KEL cable. Note that the Sony FCB-EV9500L will need to be powered externally or by a 3 Amp rated USB socket or powered hub.
- UVC software.

For the UVC software we recommend the HarrierView UVC demo application that is part of the [Harrier USB SDK](#) (Windows only); this can be downloaded from the Active Silicon web site.

Please follow the procedure below:

1. Connect the camera and interface board socket J1 using the KEL cable. If you have purchased a pre-assembled camera, the board and camera will already be connected.
2. Set DIP switch SW1 [7] ON and all others OFF.
3. Connect the interface board to the Superspeed USB port (via the powered hub if the port does not have the current capability).
4. In Windows Device Manager (or a UVC application) check the name of the camera. If it does not match your camera, please re-configure the board for as described in the section above ([Configuring the Board for the Camera](#)).

5. If the port/hub can supply enough current, the camera will start up and you can now access the video using any UVC application, e.g. HarrierView from the Harrier USB SDK.
6. If you have installed the Harrier USB SDK (Windows only) you will also be able to use the Harrier Virtual COM port to control the camera using VISCA commands from an application that uses standard COM ports, e.g. the Sony camera control application.

For support on Linux hosts you will need to ensure that you have installed drivers that support UVC (e.g. V4L drivers), please consult the documentation for your Linux distribution. Listed below are some links that may be helpful:

<http://www.ideasonboard.org/uvic/>

<https://www.kernel.org/doc/html/v4.13/media/v4l-drivers/uvicvideo.html>

[https://www.linuxtv.org/wiki/index.php/How\\_to\\_Obtain,\\_Build\\_and\\_Install\\_V4L-DVB\\_Device\\_Drivers](https://www.linuxtv.org/wiki/index.php/How_to_Obtain,_Build_and_Install_V4L-DVB_Device_Drivers)

<https://help.ubuntu.com/community/Webcam>

The default USB configuration of the Harrier USB camera/board reports that the camera requires a 1.5A USB port (as this is actually required to power the default camera over the USB link). Most modern Superspeed USB sockets are able to deliver this amount of current (see [Camera Interface Board Power Supply](#)) but Linux USB drivers often report USB ports as 900mA; this means that the Linux driver will not start the device as it thinks the port cannot deliver enough power to the camera.

This problem can be seen in DMESG:

```
[14256.348342] usb 2-1: New USB device strings: Mfr=1, Product=2, SerialNumber=7
[14256.348345] usb 2-1: Product: Active Silicon Harrier T3010-2
[14256.348348] usb 2-1: Manufacturer: Active Silicon
[14256.348351] usb 2-1: SerialNumber: 1-1602772708-TNMP3010-2
[14256.348644] usb 2-1: rejected 1 configuration due to insufficient available bus
power
[14256.348647] usb 2-1: no configuration chosen from 1 choice
[14289.711761] usb 2-1: USB disconnect, device number 3
```

The solution is to change the USB power configuration to declare itself as self-powered. You must ensure that the USB socket can provide enough power to drive the camera under all operating conditions (zoom and focus actions usually increase the camera power consumption). The HarrierControl software can be used to update the USB configuration so that it will work with versions of Linux that do not correctly identify the maximum power of the USB socket.

### UVC Example Application - Harrier USB SDK

To evaluate the USB video capability, you will need a USB Video Class (UVC) application. If you do not have a UVC application you can download the [Harrier USB SDK](#) (Windows 10 only) from the Active Silicon website. When you install this SDK, it will create a folder with working UVC example application called HarrierView. For information on how to use the application please see the section [Using the HarrierView UVC Application](#) below.

### Sony Camera Control Application

To evaluate the serial communications capability or Harrier Virtual COM port, you will need an application that can provide RS-232, RS-485 or TTL serial communication via a COM port. If you do not have a serial camera control application download the [Sony Camera Control Software](#) application.

### Setting the Camera Control Interface (DIP Switches)

The Harrier USB/HDMI Camera Interface Board supports serial communication over RS-232, RS-485 and TTL communications interfaces (on the J3 connector). The camera can be controlled by sending VISCA commands over the serial interface (usually via a COM port), or over the USB connection using the Harrier Virtual COM port (if installed), or by using UVC commands.

You can select which one of these you want to use by setting DIP switches 5, 6 and 7 on the Harrier USB/HDMI Camera Interface Board when the board power is off.

SW1-7	SW1-6	SW1-5	COMMUNICATIONS MODE
OFF	OFF	OFF	J3: RS-232 VISCA
OFF	OFF	ON	J3: RS-485 VISCA termination enabled
OFF	ON	OFF	J3: RS-485 VISCA termination disabled
OFF	ON	ON	J3: TTL VISCA
ON	OFF	OFF	J6: USB3.0 SuperSpeed (UVC/USB Virtual COM port)

**Table 1. Harrier USB/HDMI Camera Interface Board DIP switch settings for selection of camera communication interface before board power-up.**

On the Harrier Evaluation Board, J103 supports RS-232 and TTL communications, J203 supports RS-485 and TTL communications.

The Harrier USB/HDMI Camera Interface Board is shipped by default with all DIP switches in the “OFF” position. In this state, the board is configured for RS-232 communications.

## Setting the Camera Video Mode

To change the video output mode of the Camera/Harrier USB/HDMI Camera Interface Board the host/control device can send VISCA commands (via a COM port or similar serial interface) or send UVC commands (over the USB interface). For more information on setting this up see the section [Setting the Camera Control Interface \(DIP Switches\)](#) above.

Cameras usually start up in the same video mode that was set when the camera was powered down. Immediately after power-up completes, the camera interface board can be set to change the camera video mode to a user chosen mode; this ensures that on application start-up the camera is always in a known video mode. This is done by setting DIP switches 1 to 4 on the Harrier USB/HDMI Camera Interface Board as shown below, please check that your camera can support the selected mode. VISCA/UVC commands can be used at any time to change the camera video mode (requires camera reset).

SW1-4	SW1-3	SW1-2	SW1-1	VIDEO FORMAT	MODE	HDMI	USB
OFF	OFF	OFF	OFF	Default Camera Mode <sup>(1)</sup>	0	✓	As below
OFF	OFF	OFF	ON	1080p60 <sup>(2)</sup>	1	✓	✓
OFF	OFF	ON	OFF	1080p59.94 <sup>(2)</sup>	2	✓	✓
OFF	OFF	ON	ON	1080p50 <sup>(2)</sup>	3	✓	✓
OFF	ON	OFF	OFF	1080p30	4	✓	✓
OFF	ON	OFF	ON	1080p29	5	✓	✓
OFF	ON	ON	OFF	1080p25	6	✓	✓
OFF	ON	ON	ON	1080i60	7	✓	
ON	OFF	OFF	OFF	1080i59.94	8	✓	
ON	OFF	OFF	ON	1080i50	9	✓	
ON	OFF	ON	OFF	720p60	10	✓	✓
ON	OFF	ON	ON	720p59.94	11	✓	✓
ON	ON	OFF	OFF	720p50	12	✓	✓
ON	ON	OFF	ON	720p30	13	✓	
ON	ON	ON	OFF	720p29	14	✓	
ON	ON	ON	ON	720p25	15	✓	

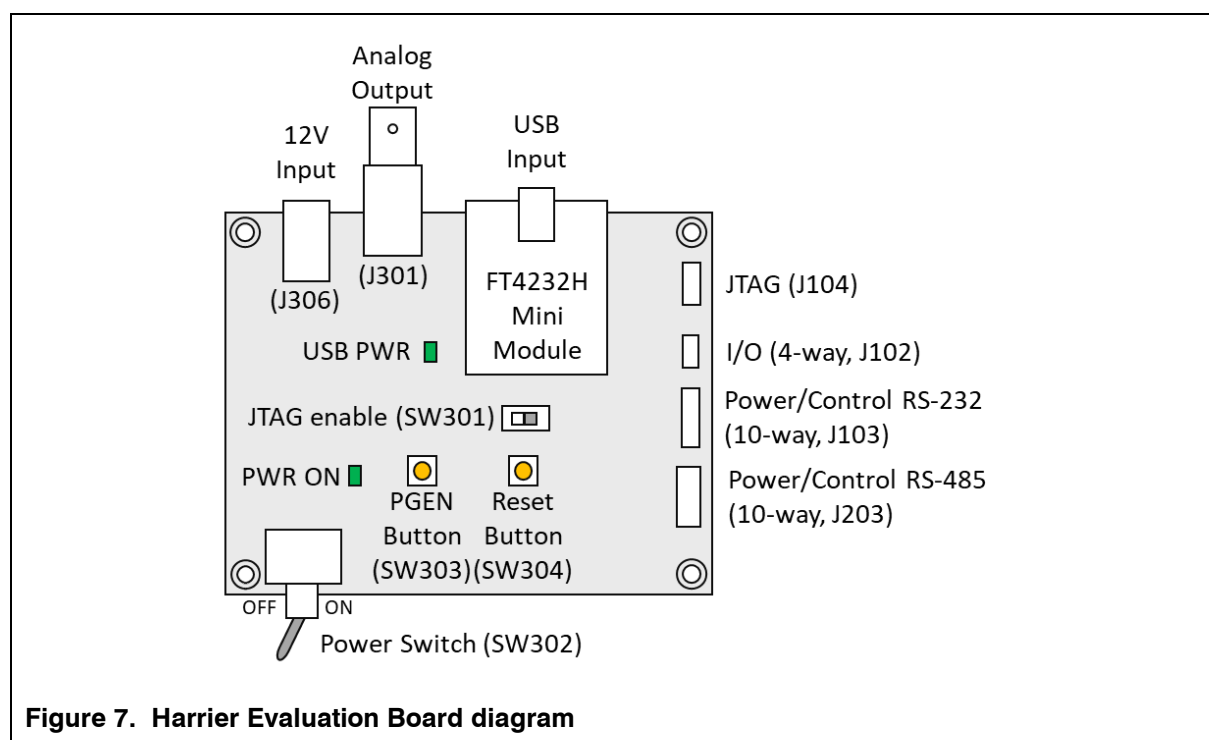
**Table 2. DIP switch settings for selecting camera video output mode**

### Notes:

- 1) "Default camera mode": on power-up, the camera will start in the video format/mode that was set/being used when it was last powered down. The video mode can then be changed by UVC

- control or by using a VISCA serial command, followed by a camera reset (there is also the camera hard reset in the extended VISCA commands which will also serve this purpose).
- 2) Due to the high data bandwidth required, these video modes (above 1080p30) require the camera to be set to dual LVDS mode. Other modes (1080p30 and below) require the camera to be set to single LVDS mode. When using VISCA commands to change camera video mode the LVDS mode must also be set correctly, otherwise there will be no video output from the camera. See your camera documentation for more information on VISCA commands for setting LVDS mode.
  - 3) **The DIP switches to select the video format are only read on power-up.** Therefore, to change mode using the DIP switches, power down the camera, set the switches and then power up the camera. DIP switches will only be effective for the operating modes supported by the camera currently in use.

## **Harrier Evaluation Board Overview**



The Harrier Evaluation Board connects to the camera interface board using the supplied cable kit.

- JTAG (J104) - white 8-way cable (connects to J4, not required in normal use).
- I/O (J102) - 4-way cable (connects to J2).
- Power/control, RS-232 (J103) - 10-way cable (connects to J3).

The board is powered by the 12V power supply via a barrel connector (J306). This supply is also used as a power supply for the camera and is connected to the camera via the Power Switch (SW302). When the Power Switch (and camera power supply) is switched ON the PWR ON LED will illuminate.

For more information please see the [Harrier Evaluation Board datasheet](#) on the Active Silicon website (see Harrier USB/HDMI Camera Interface Board - Downloads section).



## **Setting up the System for Full Evaluation**

To set up and get the Harrier USB/HDMI Camera Interface Board running please follow the instructions below:

1. Connect the camera to the camera interface board connector (J1) using the 30-way micro coax cable (connector type: KEL USL00-30L). (If you have purchased a pre-assembled camera module, e.g. AS-CIB-USBHDMI-002-9520L-A, this cable will already be connected).
2. **RS-232/RS-485/TTL communications:** to use serial communications with the camera, connect the USB A - mini USB cable to the mini USB connector on the Harrier Evaluation Board, and connect the USB A plug to a PC USB socket.  
The USB PWR LED should light up indicating a live connection to the PC.
3. Connect the camera interface board PWR/CTRL connector (J3) to the Harrier Evaluation Board PWR/CTRL connector using the 10-way cable. For:  
**RS-232** connect the 10-way cable to J103,  
**RS-485** connect the 10-way cable to J203  
**TTL** connect the 10-way cable to either J103 or J203.
4. Connect the camera interface board I/O connector (J2) to the Harrier Evaluation Board I/O connector (J102) using the 4-way cable.



**Figure 8. Harrier Evaluation Board connected to Harrier USB/HDMI Camera Interface Board and FCB-EV7520 camera.**

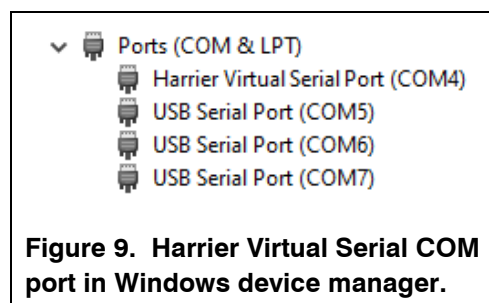
5. Set/check the DIP switch settings, e.g. SW1 [1-4] OFF (no mode change on power up), SW1 [5-8] OFF (RS232 serial communications mode), or SW1 [7] ON for UVC/USB control.
6. Set the Harrier Evaluation Board power switch (SW302) to OFF (left, viewed from above).
7. Connect the power supply barrel connector to the Harrier Evaluation Board power input connector (J306) and plug in the power supply using the plug adapter suitable for your region.
8. **HDMI:** to see the camera output on HDMI, connect the camera interface board micro HDMI out connector (J5) to a monitor that can display the video modes that you intend to use (maximum 1080p60), using the micro HDMI cable. **Note:** some monitors are not able to display 1080p30 using the micro HDMI cable.



9. Unless you want to power the board from the USB cable, switch ON the Harrier Evaluation Board power switch (SW302). The PWR ON LED should light up.
10. **USB/UVC:** to see the camera output on USB/UVC, connect the camera interface board USB Type C connector (J6) to a PC USB Superspeed capable socket using the 5 Gbps USB Type C cable. Note the board will try to power up from the USB cable unless power from the Harrier Evaluation Board is being used.
11. The camera will make audible mechanical noises as it goes through its power up sequence and after a short time the video outputs will be working.  
Note: if the DIP switches have been used to set the camera mode, and the mode last used was different to the DIP switch setting, it will take a few seconds for the camera interface board to detect this, change the camera mode and re-start the camera.
12. Please check that the camera identifies correctly in Windows Device Manager, e.g. Active Silicon Harrier S7520-2.
13. **HDMI:** If the HDMI cable is connected you will see the camera video on the monitor (if the monitor supports the mode set on the camera).
14. **USB/UVC:** If the USB Type C cable is connected you can start your UVC application and it will capture the camera video (video mode settings for the camera and UVC application must match). If you do not have a UVC application, download and install [Harrier USB SDK](#) from the Active Silicon website. This SDK contains the HarrierView UVC example Windows application. For instructions on how to use HarrierView please see the section [Using the Harrier USB SDK Example Application](#) below).
15. **RS-232/RS-485/TTL control:** The [Sony Camera Control software](#) application provides an easy way to use serial communications.  
When the Harrier Evaluation Board is plugged in Windows will set up three COM ports; these can be used with your own serial port software. Typically, the lowest COM port number is the RS-232 interface, the middle port number is the RS-485 interface and the highest port number is the TTL interface.  
COM port settings for Harrier interface boards are (baud rate is user selectable):

Baud rate:	9600	Timeout:	ON	DSR sensitivity:	OFF
Parity:	None	XON/XOFF:	OFF	DTR circuit:	OFF
Data Bits:	8	CTS handshaking:	OFF	RTS circuit:	OFF
Stop Bits:	1	DSR handshaking:	OFF		

16. **Harrier Virtual Serial COM port:** if the Harrier USB SDK is installed, DIP switch SW1 [7] is ON and the interface board USB port is connected to the PC, this COM port will appear in the device manager COM/LPT port list. It can be used to send and receive VISCA commands in exactly the same way as an ordinary serial COM port. As there is no physical serial hardware, the serial port settings will not affect the function of the Harrier Virtual Serial COM port.

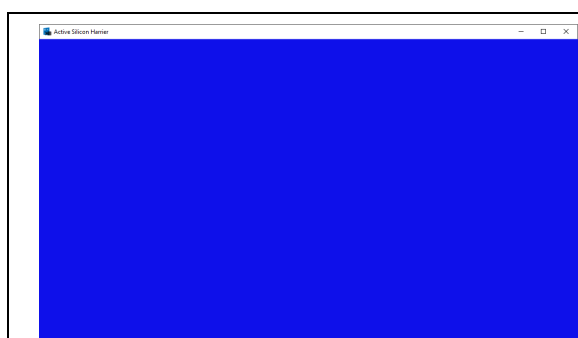


### Test Pattern

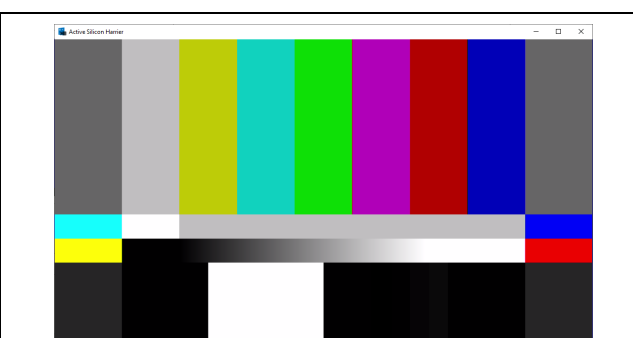
With no video input connected, a simple blue/gray screen is displayed (see Figure 10). You may see this when the camera resets.

To display a 1080p60 static test pattern (see Figure 11), press the PGEN button on the Harrier Evaluation Board.

Note: this button will only work if the 4-way cable is connected between the Harrier Evaluation Board (J102) and the camera interface board (J2).



**Figure 10. HarrierView UVC application and blue screen (indicating no camera signal)**



**Figure 11. Static Test Pattern (PGEN pressed)**

### Analog Output

The BNC connector on the Harrier Evaluation Board will supply the analog video output from the camera interface board. Note: this signal is generated by the camera (on the KEL cable) and is not available on all cameras. To enable this the camera must be set into PAL/NTSC output mode using the appropriate VISCA command and a camera reset. When this video mode is set there will be no digital video output from the camera (and the HDMI and USB video interfaces will not work).

### Reset Button

Pressing this button on the Harrier Evaluation Board causes the camera interface board and camera to reset. Many block cameras require a Reset activate certain features (e.g. change of video mode). Note: this button only works if the 4-way cable is connected between the Harrier Evaluation Board (J102) and the camera interface board (J2).

### Using the HarrierView UVC Application

Go to the Active Silicon website, download and install the [Harrier USB SDK](#).

The installation of additional drivers is not required.

Currently the SDK is only supported on Windows.

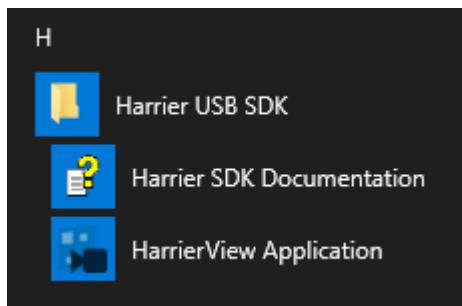
Once installed, the Harrier USB SDK documentation and HarrierView application appear in the Windows Start Menu, under “Harrier USB SDK” (see Figure 12).

In order to use the UVC controls the Harrier USB/HDMI Camera Interface Board DIP switches must be set to enable USB communications (SW1 [7] ON, SW1 [5 & 6] OFF).

Open the HarrierView Application from the Windows Start menu (see Figure 12).

The application will start up and automatically locate USB video device, the devices found will be displayed in the drop-down panel in the Control Panel – Camera panel. Video acquisition can be stopped/started using the control button on the top left of the control panel (shown in Figures 13 and 14).

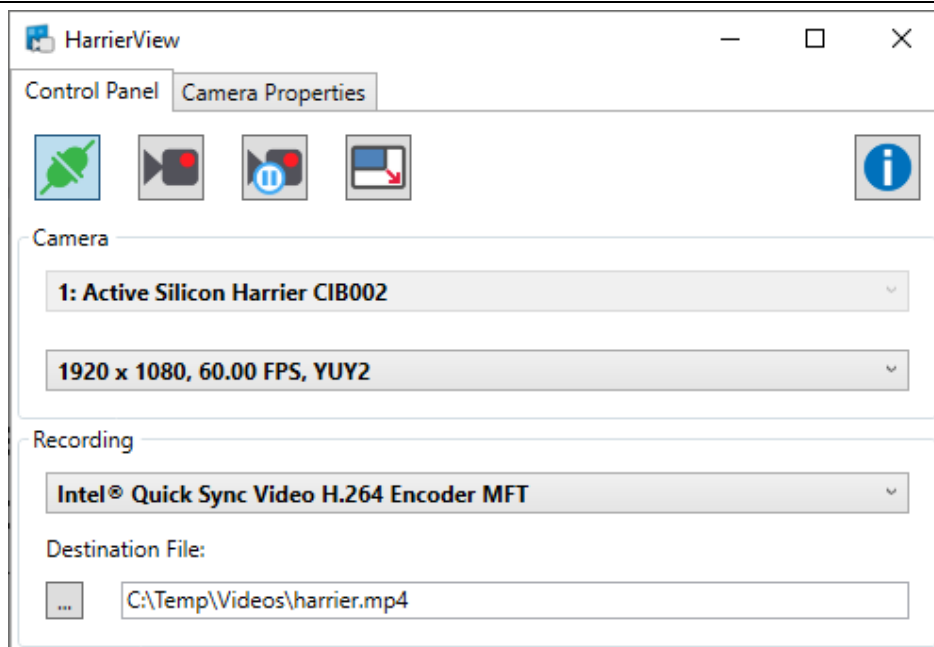
If you are using a laptop with a built-in camera, the application may select the laptop camera or the Harrier USB/HDMI Camera Interface Board as the initial video device. To select video from the Harrier USB/HDMI Camera Interface Board you may need to stop the current video (using the stop button shown in Figure 13), select the Active Silicon Harrier camera (as shown in Figure 14), and start the video again.



**Figure 12. Harrier USB SDK installation in Windows 10 Start menu**



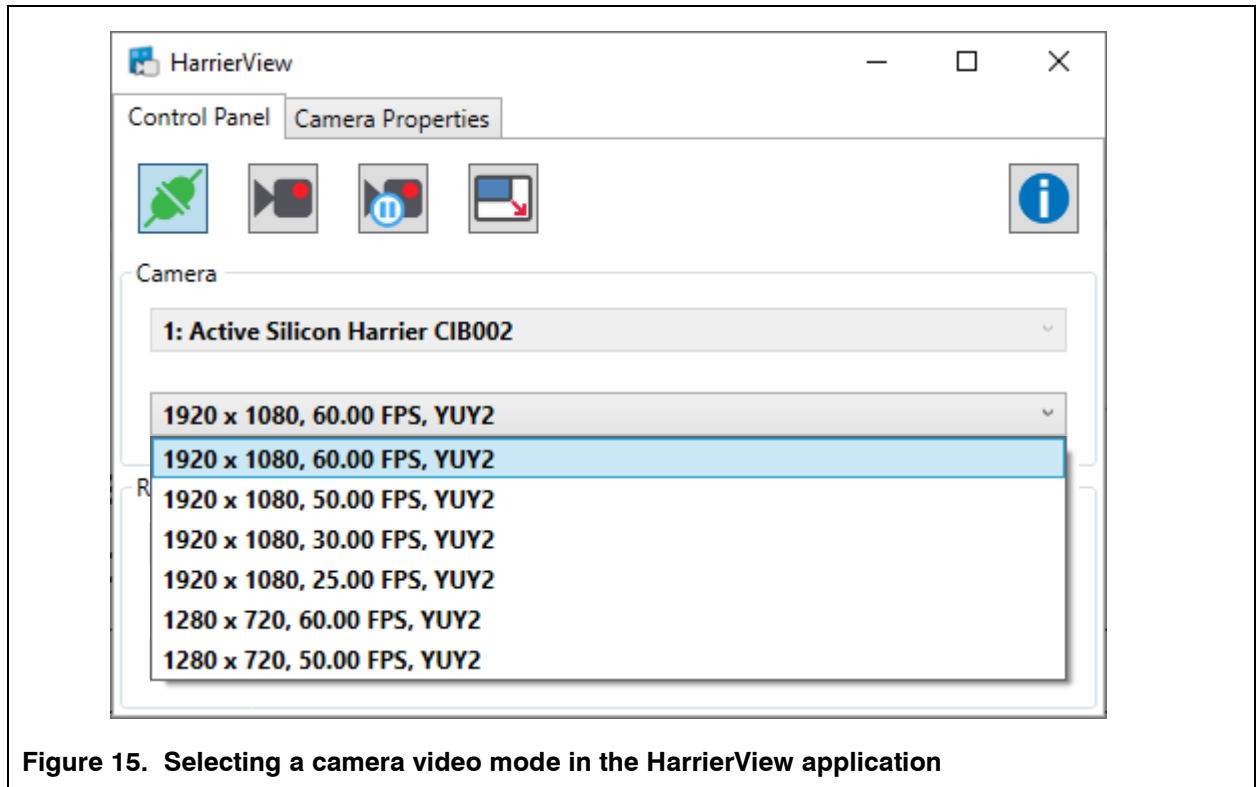
**Figure 13. HarrierView video acquisition controls (start/stop)**



**Figure 14. Selecting the video output from the Harrier USB/HDMI Camera Interface Board**

Once the video has started in the default video mode, you can then select a different video mode (see Figure 15). The video modes supported/listed will depend on the camera connected.

Once the video mode has been selected the HarrierView Application will change the camera mode with a UVC command and will then capture USB video from the Harrier USB/HDMI Camera Interface Board / camera. Note: DIP switch SW1 [7] must be set to ON.



**Figure 15. Selecting a camera video mode in the HarrierView application**

**Note:** If the video mode is then changed using VISCA control, the HarrierView Application may not be able to capture the video. The actual video mode of the camera output can be easily determined by checking the format of the HDMI output of the Harrier USB/HDMI Camera Interface Board or by using a VISCA inquiry. If the output from the HDMI interface and the mode selected in the HarrierView Application are the same please check the interface board LED for error conditions and ensure that you have a USB Type C cable of the correct specification (USB3.X Type A/C to Type C, SuperSpeed, minimum 5 Gbps). If there is a USB video error the LED will flash red and the USB and HDMI video outputs will be disabled.

You can use the other controls in HarrierView to record video and (if the video view window is larger than the resolution of the video from the camera) enlarge the video to fit the view window.

### Using the Harrier Virtual Serial COM port

The Harrier Virtual Serial COM port is part of the [Harrier USB SDK](#). This can be downloaded from the [Software section](#) of the Active Silicon website. If the SDK is installed, DIP switch SW1 [7] on the interface board is set to ON and the Harrier USB/HDMI interface board USB port is connected to the PC with a suitable cable, the Harrier Virtual Serial COM port appears in the Windows Device Manager COM/LPT port list (Figure 9).

The Harrier Virtual Serial COM port can be used to send and receive VISCA commands in the same way as an ordinary serial COM port. As there is no physical serial hardware, the serial port settings will not affect the function of the Harrier Virtual Serial COM port.

Note: by default the Harrier USB/HDMI Camera Interface Board is configured not to send VISCA command Acknowledge and Complete responses to optimize the USB video transfer. This behavior can be changed using the Harrier USB/HDMI interface board VISCA command.

### Camera VISCA control from Linux

The Harrier Virtual Serial COM port is only supported on Windows. For Linux users we provide an API that enables Linux applications to send VISCA commands to the camera over the USB connection. This gives the Linux application full control of the camera. This API can be downloaded from the Active Silicon website and is available for PC and ARM Linux platforms. Note that the UVC video system expects to be in control of the camera video mode and frame rate, so these settings should not be changed using VISCA commands.

### Technical Support

In case of any issues, please contact Active Silicon Technical Support on the telephone numbers below or by email to [techsupport@activesilicon.com](mailto:techsupport@activesilicon.com).



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